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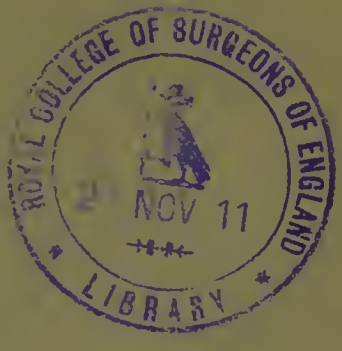

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PARALYSIS FOLLOWING RELAPSES AND SECOND ATTACKS OF DIPHTHERIA

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The following communication has been prompted by the perusal of the remarkable case, published by Dr. F. E. Coulter in this Journal, of a second attack of general diphtheritic paralysis occurring after an interval of two years. In the present paper, which is based on personal observations made on 1,600 completed cases of diphtheria at the Grove Hospital, an artificial distinction has been made between relapses and second attacks. By a "relapse" is meant the re-appearance of the disease after recovery from the initial attack, but before the discharge of the patient from hospital. The term "second attack" is applied to cases in which the two illnesses did not occur during a single period of detention in hospital. In all the relapses and second attacks as well as in the primary disease, the clinical diagnosis received bacteriological confirmation, so as to exclude those cases of non-specific tonsillitis, which, as I have shown elsewhere, are not infrequent in convalescence from diphtheria. In the 1,600 cases 27, or 1.6 per cent., had relapses, which were separated from the initial angina by intervals ranging from three to fourteen weeks. The average date for their occurrence was about the middle of the sixth week. Two of the 27 had palatal and ocular palsies after the primary attack, but none showed any signs of paralysis after the relapse. Thirty-six, or 2.2 per cent., had second attacks, between which and the first there were intervals ranging from three months to fourteen years. The period of predilection was the first three years, during which 22 of the 36 took place. In 18 the first attack had occurred in the same hospital, so that their records were available. One of the cases had paralysis during the first attack only, and three had paralysis during the second illness who had previously escaped any nervous sequelæ. In only one case were both attacks followed by paralysis. This patient was a woman, aged

26, who was admitted to hospital in October, 1900, with mild faucial and nasal diphtheria. She had previously suffered several times from sore throat. No antitoxin was given, but only local treatment was employed. After removal to a convalescent hospital, palatal palsy, cycloplegia and loss of motor power in the lower limbs developed, necessitating her detention until February, 1901. She was admitted again in December, 1906, with a more severe angina than on the first occasion, on the third day of disease, when she received 12,000 units of antitoxin. Ciliary palsy developed on the thirty-second day, and lasted till the forty-fifth. No other paralysis occurred, and the knee and ankle jerks remained active during her forty-seven days' stay in hospital.

The value of early administration of antitoxin in preventing paralysis, especially of a severe character, has been illustrated experimentally by Rosenau and Anderson, and clinically by several observers, including myself. The entire absence of paralysis following a relapse was due to the fact that the disease arising in hospital could be jugulated at once by serumtherapy, so that in every case the throat symptoms were mild. In this connection I would insist on the fact universally accepted by the physicians of large fever hospitals, but contested by some neurologists, that the frequency and severity of diphtheritic paralysis bear a direct relation to the initial angina. The partial immunity conferred by the primary attack and the initial dose of antitoxin was the cause of none of the relapses displaying those features of malignancy which are manifested by severe local symptoms, deficient reaction to antitoxin and a high mortality, and are followed by a precocious paralysis, which in survivors is of unusually long duration. Second attacks, on the other hand, do not always run a mild course, since five such cases had severe local symptoms, and two developed paralysis, in one case fatal. It would seem that the immunity conferred by the first attack had been exhausted owing to the length of the interval which in these five cases ranged from one to three years.

The references in literature to the occurrence of second attacks of diphtheritic paralysis are very meager. The following which are arranged in chronological order are the only ones which I have been able to discover after a laborious search. It will be seen that there was usually a remarkable difference in the

extent of the paralysis following the two attacks, no repetition of generalized palsy having hitherto been recorded, so that Dr. Coulter's case may justly be called unique.

Lennox Browne's Case.—A woman, aged 40, the subject of chronic albuminuria, who had been a nurse in a fever hospital for eight years, had four attacks of diphtheria in the course of three years. In two attacks paralysis had developed, in the first "slight paresis" and diplopia, and in the last attack there was loss of power in the arm and both legs, as well as diplopia.

Stocker's Case.—A child had a severe primary attack followed by palatal palsy. The second attack eight years later was followed by palatal and ciliary palsy which lasted for several weeks.

Vucetic's Case.—A boy, aged 3 years, had a severe attack, which was treated with antitoxin and was followed by palatal palsy. On the fifty-sixth day there was a relapse which was more severe than the original attack. Palatal palsy again developed, but was not so severe as on the first occasion. Recovery finally took place.

Barbier's Case.—A boy had two attacks of diphtheria, the second eleven months after the first, both of which were followed by slight paresis of the lower limbs.

It is interesting to note that prior to the introduction of antitoxin in 1894 the majority of writers were of opinion that relapses and second attacks of diphtheria were frequent and were more severe than the first. Their greater severity can also be gauged retrospectively by the fact that they were more frequently followed by paralysis, as in the cases recorded by Gull, Burdon-Sanderson, Downes, Morell Mackenzie and Dobson. Since the general employment of antitoxin relapses have become rarer and as a rule milder than the primary attack, the statistics of all authorities showing a remarkable uniformity in placing their frequency at about one per cent.

The question raised by Dr. Coulter as to what result the introduction of antitoxin has had upon postdiphtheritic paralysis has been discussed by me at length elsewhere. The high incidence of paralysis which occurred among my own cases, as shown in Table I, is eloquent proof that palsies have not become less frequent since the introduction of serumtherapy. Their frequency has indeed increased, but this is due to the fact that many

cases survive to suffer paralysis who in former times died at an early stage of toxemia. On the other hand there is no doubt that the frequency of paralysis, as well as the case mortality, could be considerably reduced by the early administration of antitoxin. The truth of this statement is confirmed by the following table, which shows that of those injected on the first day of disease comparatively few develop paralysis, and in no case of a severe character. During each of the four subsequent days the frequency and severity of the paralysis cases increase.

TABLE I.

SHOWING RELATION OF PARALYSIS TO DAY OF DISEASE ON WHICH ANTITOXIN WAS INJECTED.

	Total Number Injected.	Paralysis Cases	Percentage.	Severe Forms	Percentage.
1st day	62	3	4.8	0	0
2d day	335	54	16.1	14	4.1
3d day	384	81	21.09	32	8.3
4th day	321	95	29.5	39	12.1
5th day	214	68	31.7	36	16.8
6th day	103	32	31.06	17	16.5
7th day and later	120	28	23.3	10	8.3
	1539	361	23.4	148	9.6

Commenting on a similar table which I had compiled, a German opponent of antitoxin, Dr. Esch, recently objected that cases injected early could not properly be compared with those injected late, because the latter necessarily contained a much larger number of severe cases. To this I would answer, first, that in the great majority of my cases no local measures were employed to control the disease, and secondly, that in pre-antitoxin times early treatment had little effect upon the incidence of the paralysis. This is clearly shown in Table II, compiled by Woollacott, of cases treated at the Eastern Fever Hospital, London, in 1894, before the introduction of antitoxin.

TABLE II.

Day of Admission to Hospital.	Total Number of Cases.	Paralysis Cases	Percentage of Paralysis.	Severe Paralysis.
First day	29	3	10.3	
Second day	100	12	12.0	2
Third day	106	10	9.4	2
Fourth day	73	4	5.4	
Fifth day and later	144	20	13.8	5
	452	49	10.8	9

The almost equal incidence of paralysis in early and late cases is due to the fact that the course of diphtheria in those days was but little affected by treatment, as Henoch and Cadet de Gassicourt, whose experience of the disease was considerable, testified long ago.

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